

Original Article

Influence of ocarina practices on lung function of healthy middle-aged females in Korea

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Abstract. [Purpose] The objective of this study is to identify the influence of ocarina practices on the lung function of a group of healthy female ocarina players aged 40 and above in comparison to an age-matched group of females with no experience with ocarina playing. [Participants and Methods] Spirometry measurement has been conducted on both groups of 35 healthy females aged 40 and above, one with regular participation in ocarina practices (experimental group) and the other without (control group). [Results] FEV₁ and FEV₁/FVC values of those in the experiment group who practiced ocarina on a regular basis turned out to be significantly higher than the control group, and there was no significant difference on FVC. [Conclusion] This study indicates that ocarina practices on a regular basis helps middle-aged females improve their lung functions particularly in FEV₁ and FEV₁/FVC.

Key words: Ocarina, Lung function, Respiration

(This article was submitted Sep. 22, 2018, and was accepted Nov. 2, 2018)

INTRODUCTION

The proportion of females aged 40 and above in Korea was 28.4% (14.48 million) in 2015 that exceeded 25.6% for males (13.03 million) and is expected to increase to 30.0% (15.46 million) in 2018 and 33.5% (17.60 million) in 2025¹⁾. As the average life expectancy becomes longer, the rate of death due to respiratory disease increases. It was ranked on the top sixth cause for the death of females aged 40 and above in 2006 (5.3%) and increased to the top fourth (10.1%) in 2016. Therefore, there has been an increasing concern on diseases of respiratory organs²⁾.

As one gets older, chest movement is limited, and abdominal muscles become weaker, causing reduced lung capacity. Forced expiratory volume in one second (FEV₁) decreases by about 30 ml/year for Korean male and 22 ml/year for Korean female after the age of 30s, resulting in various respiratory diseases³⁾.

Among the respiratory training, diaphragm respiration improves the respiratory function through harmonized contraction and stabilization of lumbar and diaphragm in muscle transversus abdominis⁴⁾, and forced respiration exercise for controlling the amount and method of respiration makes exhalation more efficient by reducing the difference of pressure in alveolus by slowly inhaling and exhaling through lip⁵⁾.

Choi reported that, according to the respiration training program for six weeks on patients with stroke in the use of recorder, FVC turned out to increase by 35%, and FEV₁ increased by 40% making lung function improved⁴⁾. Jeong reported that, according to the results of respiration training program for eight weeks on seniors older than 60 in the use of pan flute, FVC turned out to increase by 1.7%, and FEV₁ increased by 5.0% along with FEV₁/FEV increased by 3.2%⁶⁾.

Because Ocarina has a unique timbre and can be carried easily compared to other wind instrument, performed conve-

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niently to make sound and use fingering techniques, it has been very popular recently in Korea⁷). In early 2000 it was an unfamiliar musical instrument played only by some enthusiasts. Since 2000 Ocarina has become widespread, a lot of clubs and ensembles has been created and active. The population of ocarina in Korea is growing rapidly and estimated to reach 3 million by 2017⁸).

According to characteristics of wind instruments, tune is significantly influenced by the breathing at a low-pitched band. Therefore, wind instruments are appropriate for respiration training⁷). Like other wind instruments ocarina also needs to do abdominal breathing in order to produce a stable and beautiful sound. In abdominal breathing diaphragm contracts and a large amount of air is inhaled in a short time during inspiration. On the contrary diaphragm relax during expiration. Through this process, wind instrument players must control the flow of air to make the sound properly by controlling the diaphragm and enlarging the thorax. Therefore, abdominal breathing is a breathing exercise that must be practiced by a wind instrument player constantly⁹).

Ocarina practice distributed as a leisure activity for middle-aged females is closely related to respiration trainings, stimulating the interest of participants and deriving continuous and voluntary training from participants unlike general respiration training. Various methods have been used to prevent diseases on respiratory organs. Among them, based on the claim that practices of wind instruments could reinforce the abdominal respiration and forced respiration, this study has been conducted to see how ocarina practices influenced on the improvement of lung function of females in middle ages¹⁰).

PARTICIPANTS AND METHODS

Seventy participants were divided into two groups. The experimental group consisted of 35 females aged 40 and above in the D Ocarina Club in Daegu, and they all had more than one year of experience for ocarina practices. In the control group, there were 35 ordinary females aged 40 and above who belonged to B welfare center in Daegu. In both groups, those with the history of respiratory diseases were excluded. Both groups were measured with Forced Expiratory Volume in one second (FEV₁), Forced Vital Capacity (FVC), and FEV₁/FVC in the use of lung capacity measuring unit (Cardiotouch-3000s spirometer from Bionet Company) on August 2018. The forced vital capacity (FVC) is the volume delivered during an expiration made as forcefully and completely as possible starting from full inspiration, the forced expiratory volume (FEV₁) in one second is the volume delivered in the first second of an FVC and FEV₁/FVC is the ratio of forced expiratory volume in one second (FEV₁) over forced vital capacity (FVC)¹¹). The lung capacity was measured by the method suggested by American Thoracic Society and European Respiratory Society. The procedure was as follows: The participant was taken to assume the correct posture, attach the nose clip, place the mouthpiece in mouth, inhale completely and rapidly, and exhale maximally until no more air can be expelled¹²). At least 3 times of measurement was taken. The highest value from three times of measurement was used for analysis. Research purpose and method were explained to all the participants prior to participating in the study, and all participants provided written informed consent according to the ethical standards of the Declaration of Helsinki and agreed to participate in the study.

The participants of the experimental group (age: 59.23 ± 7.01 years, height: 160.37 ± 4.76 cm, weight: 56.06 ± 6.41 kg) have practiced ocarina regularly (5.23 ± 4.76 years, 2.94 ± 1.39 times/week, 8.87 ± 5.08 hours/week). The basic method of practice is that participants attend group practice for 2 hours twice a week and practice at home individually. The participants of the control group (age: 60.20 ± 12.60 years, height: 158.57 ± 4.25 cm, weight: 56.06 ± 6.02 kg) have no experience in ocarina practices.

As for statistical analysis, IBM SPSS Statistics Version 21 was used. Descriptive statistical analysis was conducted on the general characteristics, and independent-samples t-test was conducted to verify the difference between control group and experimental group. Significance level was p<0.05. FVC, FEV₁, and FEV₁/FVC were all influenced by the height and weight besides gender and age. Therefore, measured spirometry data values were converted to percentage on the expected values of standard lung capacity in Korea in the use of normal predictive equation for the analysis³).

RESULTS

Experimental group had FEV₁ and FEV₁/FVC significantly high as shown in Table 1 (p<0.05), and FVC did not represent any significant difference.

DISCUSSION

FEV₁ and FEV₁/FVC of females aged 40 and above who practiced ocarina on a regular basis turned out to be significantly higher than those in the control group. The cause of the difference of FEV₁/FVC in two groups was from the difference of FEV₁. The significant difference of FEV₁ seems to be from ocarina practices on a regular basis.

FEV₁ in the experimental group turned out to 98.89% that was significantly higher than the one in the control group, 83.40% because of pursed-lip breathing that was frequently used in respiration training during the ocarina practices. Therefore, they seem to be trained on the respiration continuously during the practices⁶). Continuous forced respiration exercise from ocarina practice improved respiration capability leading to the improvement of trunk-muscle to cause a significant difference⁴).

Table 1. Comparison of the results of the FVC, FEV₁, FEV₁/FVC between the experimental and control groups

		Experimental group (n=35)	Control group (n=35)
FVC	%	86.13 ± 7.75	84.58 ± 10.64
	L	(2.81 ± 0.33)	(2.69 ± 0.51)
FEV ₁	%	98.89 ± 10.48*	83.40 ± 11.36*
	L	(2.57 ± 0.30)	(2.09 ± 0.43)
FEV ₁ /FVC	%	114.85 ± 7.27*	99.16 ± 11.29*
	%	(91.57 ± 5.07)	(77.87 ± 8.69)

Spirometry data are means ± standard deviation (SD) and expressed as percent of the predicted values, the original spirometry data values are written in parentheses.

*p≤0.01 between the experimental and control groups.

In general, FEV₁/FVC is used as a main index for obstructive lung disease. If the FEV₁/FVC is less than 0.7 in the spirometry test, it is considered to have obstructive ventilatory impairment. FVC<0.8 means restrictive ventilatory impairment¹¹⁾. FEV₁/FVC in the experimental group was 114.85% that was significantly higher than the one in the control group, 99.16%. This can be interpreted that ocarina practices positively influenced on the lung function. Females in Korea tend to have FEV₁ reduced about 22 ml every year after the age of 30s, and such a decrease in FEV₁ is led to the decrease in FEV₁/FVC causing the disease in respiration including obstructive lung disease. Therefore, a significant increase in FEV₁/FVC from the increase of FEV₁ in the experimental group reflects how lung functions of females aged 40 and above significantly improved. On the other hand, there was no significant difference in FVC between the experimental group and control group.

As for limitations of this study, it is difficult to generalize the results of research because there were only a small number of participants and they were all females. FEV₁ and FEV₁/FVC in the experimental group were higher than those in the control group. However, it is not possible to identify how much long participants need to practice ocarina to have FEV₁ and FEV₁/FVC significantly increased. Considering such issues, it seems that follow-up research is required in the future.

In conclusion, ocarina practices can be considered as a leisure activity for influencing positively on the lung functions of middle-aged females.

Funding

None.

Conflict of interest

None.

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